Hand Washing Prevents the Spread of Methicillin-Resistant Staphylococcus aureus in the Clinical and Community Setting

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Abstract

Preventing the spread of Methicillin-Resistant Staphylococcus aureus (MRSA) remains high on the agenda of health-care agencies. A common thread from all articles reviewed indicated the most effective way to prevent the transmission of MRSA in health-care settings, as well as within the community, is proper hand washing. Evidence-based research strongly recommends a focus on hand-washing education, which includes teaching clinical staff, patients, nursing students, and members of the community.

Keywords:

Article 1

OCS= Operation Clean Start, MRSA= Methicillin-resistant Staphylococcus aureus
DeBug= 70% isopropyl alcohol, 0.5% chlorexidine, skin emollient, ACHRS= alcohol/chlorexidine hand hygiene solution

Article 2

Colonization rate= growth rate of the bacteria, Screening= active surveillance of infection control, Nosocomial= taking place or originating in a hospital

Article 3

Nosocomial infection= hospital acquired, Community acquired infection = Infection acquired by someone who has not recently been in a hospital setting, Teaching= proactive measures,

Evidenced based= best practice applied to a work environment

Article 4

Student athletes, Disease prevention
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Methicillin-Resistant Staphylococcus aureus (MRSA) is a world-wide health problem that continues to spread despite continued research and the development of new antibiotics centered on destroying the MRSA pathogen. In the United States, MRSA is now the number one nosocomial infection (Baragona, 2006). The Department of Health and Human Services, Center for Disease Control (CDC) estimated that in 1980 less than 5% of all S aureus infections involved MRSA, but by 1999 more than 40% of all infections were cultured for S aureus. Now it is estimated that up to 63% of all infections in the United States are attributed to S aureus (Larson, Cohen, Ross, Behta, 2010, p.17). The CDC also estimated that approximately 30% of nasal cultures would return positive for a staph bacteria if performed on the entire United States population (CDC, 2005).

To slow down the progression of MRSA, a central theme of hand washing surfaced in most articles reviewed. The simple act of hand washing saves lives. More and more nursing-based research supports Evidence-Based Nursing Practice in the prevention of nosocomial infections. The goal of this paper is to educate and promote universal hand washing, which is credited in slowing down the rapid spread of MRSA in the clinical setting and within our communities.

Description of Four Research Articles

Article One Summary:

“Efficacy of an alcohol/chlorhexidine hand hygiene program in a hospital with high rates of nosocomial Methicillin-resistant Staphylococcus aureus (MRSA) infection” (MJA, 2005).
This article is the research findings of a hand washing study in the Austin Health 840-bed University of Melbourne Australia teaching hospital; it is comprised of three different campuses. They studied and measured results in five hospital areas, Levels 8, 9 (both are Med. Surgical areas), Spinal floor, Renal floor, and the ICU. This article was published in the MJA (Medical Journal of Australia) (Johnson, 2005).

The goal of the study was to evaluate care worker compliance of hand washing using DeBug, and evaluate the reduction of MRSA. This research study included six RN’s whose fields were related to infectious disease prevention as researchers, as well as MD’s, Hospital Administrators, Department heads, and Microbiologists (Johnson, 2005).

**Article Two Summary:**

“The Role of Gowns is Preventing Nosocomial Transmission of Methicillin-Resistant *Staphylococcus aureus* (MRSA): Gown Use in MRSA Control” research article focused on a study of the clinical setting and the role that isolation gowns and hand washing play in the prevention of nosocomial transmission of MRSA. The study was conducted at a 316-bed community hospital and collected data over a two-year period to assess the outcome of controlling the spread of MRSA. The goal of this study was to “assess the impact of removing gown use from the protocol for MRSA isolation” (Grant, Raman-Hadded, Dendukuri, Libman, 2006, p. 191). For comparison, researchers designated five patient units for non-intervention and two patient units for intervention. Gowns and an alcohol-based hand disinfectant were used in non-intervention units C, D, E, F and ICU. Only the alcohol-based hand disinfectant was used in intervention units A and B. In those two units, there were a total of 80 beds.

There was a mixed number of patient beds, ranging from private rooms to as many as four beds to a room. The study included routine active observation of the infection-control process.
Article Three Summary:

The article entitled “Empowering Your Patients in the Fight Against Methicillin-Resistant Staphylococcus aureus” (MRSA) was written by Christine K.Tisinger, RN, BS, CEN in 2007. She is a staff nurse in an emergency department. She acknowledged the assistance in writing and editing this article from two other nursing professionals. The purpose of the article is to aid in teaching patients about MRSA using the latest research about how MRSA is transmitted (Tisinger, 2007, p. 204). The article discusses the prevalence of MRSA in all corners of the globe and its resistance to treatment with antibiotics. The author uses current evidence and the recommendations from professional agencies as the basis of her teaching guidelines. A background of MRSA is discussed, using community acquired MRSA and hospital-acquired MRSA. A table with factors associated with MRSA infections is listed (Tisinger, 2007, p.205). The Center for Disease Control (CDC) (2005c) research indicates that MRSA is spread primarily through unwashed hands. Teaching patients can empower them with proactive measures to prevent further spreading. Hand washing instruction is considered an important task for nurses. Patient teaching guidelines are listed (Tisinger, 2007, p.207). These guidelines include basic hand washing steps, housekeeping and laundry advise, wound care, sharing rules, and pet concerns. Pets have the potential to transfer MRSA to humans (Tisinger, 2007, p. 204). Advice is also given on when to wash, for example, after contact with a wound surface (Tisinger, 2007, p.207). Making patients more aware of cross contamination is emphasized.

Article Four Summary

The focus of this research article “Preventing Community-Associated Methicillin-Resistant Staphylococcus aureus (MRSA) Among Student Athletes” is to examine the population who are
at risk for contracting and spreading the infectious disease among the community. It also defined the community-associated MRSA (CA-MRSA) as having new strains which were different from the nosocomial infection that are found in patients who were hospitalized, immunosuppressant, and who were from long-term care facilities. This type of strain is found in the urinary tract, surgical wounds, and in the bloodstream or lungs as pneumonia. The new strain of MRSA has been found among the healthy population of student athletes from high school, college and professional athletes, who have not had any recent exposure to a hospital or any surgical intervention (Journal School of Nursing, 2009). These are the group of populations who are at risk of contracting and spreading the infectious disease. The CA-MRSA is commonly spread by direct skin-skin contact it has become more prevalent in the community. At any given time, 25% to 30% of the population can be carriers (Many P. 2008, p.1). The most important method to manage the spread of this acquired organism is by hand hygiene, “A study of 6,000 students from five states that examined the effect of the use of hand sanitizer on elementary school absenteeism found a 19.8% reduction in absenteeism due to illness” (Many P., 2009, p.3).

**Critical Appraisal of the Evidence**

**Article One:**

*The guidelines for data collection*

Data was calculated from the differences of the baseline data at the start of the research in May of 2001. The study started in May of 2001 and ended in April of 2004. This study screened patients, staff, and the equipment and environment for the presence of MRSA (Johnson, 2005).

Nieswiadomy lists five questions that need to be asked when evaluating data, what, how, who, where, when (Nieswiadomy, 2008, p. 384). The “what” was research about preventing MRSA, the article covers this completely. The “how” and the “who” was the gathering of
baseline data, as well as collecting data of compliance from staff, patients, and the environment and equipment by documented observations and specimen collection testing. These three years of data were calculated in percentages and placed on linear regression curves (Johnson, 2005). The “where” was in The 840 bed University of Melbourne Australia teaching hospital, done in five different units comprised of three separate campuses. The “when” was May 2001 to April of 2004 (Johnson, 2005).

Study results

The studies compliance results with the use of the available DeBug hand washing solution, increased to 41% compliance from the baseline of 21% compliance. The reduction of hospital MRSA was reduced by 57% in the staff, environment and patients (Johnson, 2005).

Cost savings

The study did not do a detailed cost analysis, Nieswiadomy on pg. 370 talks about how cost must be considered with recommendation of changes (Nieswiadomy, 2008).

This study stated that “to maintain the OCS program it would require about $180,000 per year”. This was estimated to be a cost of $2.50 per each patient discharged from their hospital. In the U.S. it is estimated that it will cost $27,000 to treat a MRSA bacteraemia (Johnson, 2005).

Study limitations

The limits to the study were that it was a quality improvement project, and not a primary research study. They used several simultaneous interventions, like teaching staff and patients, cleaning equipment with the alcohol wipes, and the staff using the DeBug cleaner. This would allow different variables. The researchers also used computer data bases, instead of direct chart reviews, they did this because it was easier to do and it would prevent assumptions about where or when the person was infected in the hospital setting (Johnson, 2005).
Discussion

In the articles’ discussion section they state, “We have confirmed the findings by Pittet et al, in which the introduction and promotion of alcohol/chlorhexidine hand hygiene solution (ACHRS) to a large teaching hospital was followed by sustained improvements in both hand hygiene compliance and reductions in MRSA infections” (Johnson, p.8, 2005).

Summary

The understanding of this research implies that hand washing using an ACHRS does decrease the incidence of the spread and acquiring of MRSA.

Article Two:

Guidelines for data collection

The study included a variety of patient diagnoses but avoided geriatric long-term care units, psychiatry units, and obstetrics units (Grant, et al, 2006, p.191). Screening was completed on patients who met the following criteria: admittance in the past six-months to any health-care environment; contact with a known MRSA carrier; or a past diagnosis of MRSA (Grant, et al, 2006, p. 191). Baseline transmission rate was gathered from February 2001 to January 2002 (period 1). The second baseline collection was from February 2002 to January 2003 (period 2).

Conceptual framework

Each hospital unit in the study was individually assessed for possible transmission of nosocomial MRSA to their patients. A negative binomial regression analysis was used to determine the number of MRSA transmissions per unit, per month (Grant, et al, 2006 p.191). The analysis is a probability distribution process that evaluated how often a specific situation will repeat again. Each month a point-prevalence evaluation was completed focusing on the number of MRSA carriers identified per unit. The evaluation was completed monthly to track the number
of MRSA transmissions variables per unit. The Bayesian approach was run on the results, which provided an estimated transmission rate between the units wearing isolation gowns and the units that did not wear the isolation gowns but focused heavily on alcohol-based hand sanitizers.

The data collection was entered into WinBUGS software to obtain a statistical graph to estimate the difference level of transmission rate using the negative binomial model. “Our conclusions did not change when other observed point prevalence’s were used in the model” (Grant, et al, 2006, p. 191).

**Study results**

There were 3,224 patients admitted during the study period. Of that total, 1,280 met the criteria for study screening. Surveillance period 1 yielded 630 eligible patients (37.5%) out of 1,678 admitted during that time. Surveillance period 2 yielded 650 eligible patients (42.0%) out of 1,546 admitted. The screening process found a mean MRSA colonization rate at 10% (Grant, et al, 2006 p. 192). New MRSA cases on intervention unit B increased slightly while new cases on intervention unit A were lower. “The regression model showed that the study protocol did not significantly affect the MRSA transmission rate. However, the point prevalence of MRSA colonization correlated with the rate of transmission on individual wards” (Grant, et al, 2006, p. 192).

**Cost savings**

There is no cost saving addressed in this article.

**Study limitations**

There were study limitations related to isolation precautions in the hospital setting. Unfortunately there was a house-wide *C. difficile* outbreak, which required staff to follow all hospital guidelines for this infection. This made the outcome on the intervention units A and B
questionable because they followed the specific guidelines in caring for patients with *C. difficile*, including the use of gowns and hand washing.

There is a possibility that the initial estimated transmission rate was low because actual cultures had not been randomly completed on patients who had an MRSA infection or a previous exposure (Grant, et al, 2006, p.193). These authors state “This hypothesis merits further study before it can be generalized to all hospitals” (Grant, et al, 2006, p. 193).

**Discussion**

The researchers admit that the impact of hand washing on the spread of MRSA is impossible to estimate. However, this study supports hand washing as a very basic but important remedy that helps prevent the spread of MRSA. The study concurs with two previous studies whose outcomes were similar. “The contribution of gowns to the prevention of MRSA transmission appears to be small” (Grant, et al, 2006, p.193).

**Article Three:**

**Guidelines for data collection**

The article is based on case reports, scientific literature, and the recommendations of expert professional groups (Tisinger, 2007, p. 204). The results of several studies have been combined and analyzed, as in a meta-analysis study (Nieswiadomy, 2008, p. 313). The author uses several recommendations from the CDC in her guidelines. She acknowledges that there is much information and literature on MRSA and that she reviewed a small portion of this (Tisinger, 2007, p.209). The research data that was collected supports the conclusion that there is a lack of definitive guidelines for teaching proactive measures.

**Hypothesis**

There is no clear hypothesis; however, the author asks the question in regards to proper hand
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hygiene: “How often do practitioners give patients concrete stepwise instructions for this basic but important task?” (Tisinger, 2007, p.206). She used this question as a basis for her data collection in researching teaching on MRSA. She also states, “The most powerful weapon in averting transmission of MRSA in the community as well as in the healthcare settings is proper hand hygiene. “ (Tisinger, 2007, p.206).

**Review of literature**

The review of literature shows the oldest reference article in 2000, but the majority of the references were less than 5 years old. The Table 1 lists factors associated with MRSA infections (Tisinger, 2007, p.205). These factors are all based on cited references. These references included evidence-based research that was completed in a state prison, among military trainees, and among tattoo recipients.

**Discussion /Study results**

The conclusions are based on the author’s review of evidence from other sources. She concludes that there is a need for more information regarding the management of MRSA, which is a global problem. In teaching patients about MRSA, it is not necessary to distinguish between the hospital acquired or community acquired pneumonia. For reasons such as using appropriate treatment, research, and tracking of the disease, it is important to distinguish between the two types (Tisinger, 2007, p. 205). Part of the plan to address the MRSA problem includes education of the affected population who are involved in spreading it. Guidelines for patient teaching are designed to curb this spread and assist in managing outpatients who are infected. (Tisinger, 2007, p.210). In order to offer effective teaching of patients with MRSA, healthcare providers must understand the importance of good personal hygiene, housekeeping, and hand washing, and consider all MRSA infections as contagious (Tisinger, 2007, p.206). Hand washing techniques
that were developed by the CDC give the patient step by step instructions in this very important task. Teaching can empower patients to make healthy lifestyle choices, which in turn will positively impact the outcome of treatment and containment of MRSA (Tisinger, 2007, p.204).

**Article Four:**

*Review of literature*

In this research article the study was done based on the review of previous literature which indicated the CA-MRSA is a common infection. The findings indicated wound cultures positive for CA-MRSA had increased from 7% in 1993 to 29% in 1999. Another study indicated that CA-MRSA found in soft-tissue wounds of 14 of 49 patients (29%) in 2001-2002, and 30 of 47 patients (64%) in 2003 to 2004 (Many P. 2005, p. 2). Further review of the study strongly supported increasing numbers of infection was correlated to student’s athletes in high school, college and professional athletes. The link among this population during the course of the research found the CA-MRSA strains were found in healthy individuals where skin integrity was compromised: skin abrasion, turf burns, shaving, sharing personal items like towels, equipments, and balms. The overview of the study results provided a strong evidence that the best method of preventing the spread of CA-MRSA is by hand hygiene which is either by hand washing or using alcohol based solution (concentration of alcohol 60-95%), (Many P. 2005, p. 3). In addition, the literature used for this research was from primary sourced articles, cited by the author within the last seven years. Overall the focus of this study was on the CA-MRSA, and how this infectious disease is on the rise. Further reinforcement is needed to educate the community to prevent this from becoming an outbreak.

*Study framework*

There was no identified study of framework used in this research.
**Hypothesis**

There was no hypothesis stated in this research.

**Limitations**

There were no limitations identified in this article.

**Research design/data collection**

In this research the method of data collection used was from population-surveillance. This survey was conducted through hospitals of different geographic areas in the United States. This survey study is considered of a non-experimental design (Nieswiadomy, 2005, p. 158). The data was collected by a combination of interviews and questionnaires and was considered as a longitudinal survey study. As mentioned previously this study conducted from 1993-2002. This method of data gathered has been considered cost effective as well as providing accurate information (Niewswiadomy, 2005). There was information on regarding the validity of the data during this study in this article.

**Sampling method**

The study included data from a large population-based study that investigated clusters of MRSA skin infections among the different athlete groups. The football players, wrestlers, and the fencing team were examined and these groups of population who did not have any previous contact with each other. There were two to ten cases identified per team (Many P., 2008, p.2). This survey study did not indicate any control group, but data collected was from the population.

**Data analysis/results**

There was no statistical data to support this research. The numeric number was included in the report body of the paper, but there was no graph or charts provided, to make a further
comparison of the study. The body of report indicated the percentage of CA-MRSA is increasing and is at risk of spreading.

**How the Evidence is Affected by Your Experiences**

**Article 1**

In article 1 the evidence supports the hand washing policy for teaching, and implementation, which has been done in the hospital that I have worked in. The hospital provided alcohol based hand cleaners to the staff, and placed containers in the patient rooms and in the hall ways. They did this to prevent the spread of infections in the hospital setting. The research does show that hand washing does decrease the numbers of hospital acquired infections.

There were sixteen other studies done related to MRSA that have cited this article in their research articles (Johnson, 2005). This also reinforces the validity of this study for me.

**Article 2**

Article two gives a very strong argument supporting the importance of hand washing and a recommendation for further study to remove isolation gowns as an intervention to prevent the spread of MRSA. The clinical practice for staff at Holland Hospital supports hand washing with a policy that states “wash in, wash out”, using an alcohol-based hand lotion upon entering and exiting a patient’s room. To support this policy, each unit relies on “moles”, which assess a total of 50 employee encounters with patients a month and then report their observations. Holland Hospital’s goal for hand washing is 100%, no exceptions. We have been striving to reach that goal for several years and our monthly average range for the past year has been 92% to 96.5%.

At this time, the removal of the isolation gown from our MRSA isolation practice at Holland Hospital is very unlikely, based on the evidence. The MRSA rate at Holland Hospital remains very low, with no documented nosocomial MRSA transfer to our patients.
The aim of the article is to emphasize the importance of teaching patients about hand washing in preventing the spread of MRSA. The spread of MRSA is a concern for all hospitals and for the community as well. As the article indicated, it is the number one offender in nosocomial (hospital acquired) infections. The hospital that I practice in has placed a big emphasis on “wash in, wash out”. This means washing my hands when I go into a patient’s room and then washing on the way out. Washing can be with soap and water or an alcohol-based sanitizer. Hand washing is considered the gold standard in preventing the spread of MRSA. After reading this article, I am again reminded of the importance of proper hand washing. However, I also take away from this the importance of also teaching patients, families, and the public about preventing the spread of MRSA. Since this is a global problem, the hand hygiene teaching can apply to everyone. The basic teaching guidelines (Tisinger, 2007, p.207) are useful in teaching patients and families the basic rules for preventing the spread of MRSA. The author also discusses the spread of MRSA through the family pet in the Table1—which includes factors associated with MRSA infections (Tisinger, 2007, p.205). This is something that is relevant to many households. Education on MRSA can help patients in dealing with this diagnosis, lessen anxiety, assist them in making healthy lifestyle choices, as well as stopping the spread.
**Article 4**

Overall the research results highly recommend that hand hygiene is the single most effective method of preventing the transmission of organisms in the community, and in the staff to patient contact.

Therefore, the simple act of hand washing by the individual to prevent the spread of MRSA can save lives. Hand hygiene has always been part of nursing practice. In surgery where water is not available to wash your hands, hand sanitizer is placed in every room to use before and after patient care. In the intra-operative area, hand hygiene is being monitored by an unknown team member and reported, an update to the unit staff is done quarterly “how we are doing.” Also this data is collected and reported as part of the Arbor survey to obtain the benchmark, and part of the goal is sharing profit in this organization. The benchmark goal for the entire hospital staff is to achieve 94% to receive the annual bonus check.

**Recommendations**

Our recommendations as a group highly support education of clinical staff and the community on hand hygiene. To teach patients, clinicians, and the community, the importance of proper hand hygiene to prevent the spread of MRSA. A hand-hygiene informational packet that includes components of hand washing, recommendations of alcohol-based solution and the “when to wash” advise should be made available. As a group we recommend further study of the educational component of hand washing in the prevention of MRSA.

**Conclusions**

In the review of the research articles for this project, each article strongly supported the use of hand hygiene. This could include soap and water or alcohol-based solutions. A
combination of research studies and a meta-analysis study was used. Education of patients and clinical staff on proper hand hygiene has proven positive results. As a group, we highly support the education of proper hand washing in the clinical setting and the community.
References


Additional References


Additional References


Additional References


